The Monthly Review of the AMERICAN ELECTROPLATERS' SOCIETY

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The Monthly Review

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A Society for the Advancement of the Science of Electroplating

AUGUST 1940

I pledge allegiance to the Flag of the United States of America and to the Republic for which it stands, one Nation indivisible, with liberty and justice for all

W. J. R. KENNEDY, *Editor*
W. W. McCORD, *Associate Editor*

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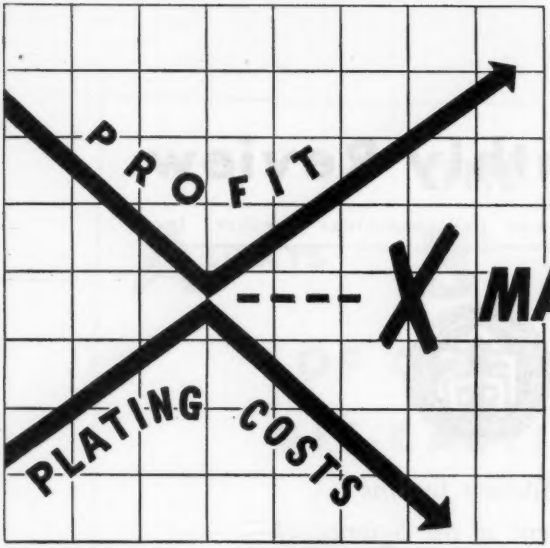

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Editorial

Irving Berlin wrote a great song when he composed "God Bless America" but we are rather afraid he should have entitled it "God Help America" because they seem to be unwilling to help themselves.

If you will go back and re-read our editorial in the issue of November, 1939, you will recognize that we are no war-monger. We did not know then, nor do we know now, whether this country is in real danger of war.

We believe in democracy. It is probably the most inefficient form of government ever devised by the mind of man. It creaks in every joint, but it is also the only form of government under which the average individual can live in any measure of personal liberty. Therefore is should survive.

We are not at all sure it is going to do so, and the fault, gentle reader, is yours. Democracy, if it is going to work, entails responsibilities by every member of the commonwealth. There can be no attitude of "Let George do it." Under any such attitude, democracy falls flatter than the proverbial pancake. You share the responsibility whether or not you agree with what is being done. It is only when all citizens recognize the right of the majority to rule and accept the results of that ruling, whether or not they personally consider them right or wrong, that democracy will function.

Mr. Hitler must be having many good laughs at our expense, because we are proving a perfect exemplification of all the weaknesses which he has pointed out in democratic forms of government.

The average Englishman cannot appreciate a great many of our types of jokes, but that does not mean that he is devoid of a sense of humor, and undoubtedly he is enjoying many a quiet chuckle over the nation which spent three years talking about "Muddling England."

Gentlemen, the preparedness program is not going over as it should. That is not the fault of the Administration. They know

what they want and they have not hesitated to ask for it. It is not the fault of the volunteers who are giving their time and energy to accomplish it. It is not the fault of Congress. They certainly have been liberal in opening the purse-strings.

The fault lies partly with the system but principally with the people who will not play ball and that embraces a considerable part of the population.

We reiterate that we do not know whether we are in danger of war, but one of two things is true. We either are, or we are not. If we are not, then there is no need for the expenditure of fifteen billion dollars, but it would be hard to find anyone who really objects to that, although probably a good many people do not realize how hard that is going to hit their individual pocket-books, and perhaps there might not be such unanimity, if they did. Anyway everyone seems pretty well convinced that the only procedure to follow is to go ahead and prepare to the limit, but then comes the rub.

There is only one excuse for doing it at all, and that is that we are in danger if we do not. If we are in danger, then any considerations of private discomfort at the present time fade into insignificance compared to what would happen if the worst came to the worst. The trouble is that the average individual does not make that comparison. He wants to have his cake and eat it, too. He does not want Mr. Hitler, but he also is not willing to make any personal sacrifice, or allow the preparedness program to interfere in any way with his personal routine or well-being.

We have scant sympathy for the flag-flapping, band-playing propaganda of the former war. We fail to see why the picture of a fifty million dollar engine of death-dealing destruction should be the occasion for any wild outburst of acclaim in a movie house. Warships are a necessary evil but we are no more proud of them than we are of the rolls of muscle across the stomach of a prize-fighter. Both serve the function of defense, but neither are pretty subjects for thought.

However, this country is squarely up against a situation. It is perfect nonsense to spend fifteen billion dollars on defense equipment and not have trained men to operate them. A Gallup poll taken a few weeks ago showed 77 percent in favor of conscription, but when the bill comes in and we discover that our son might have his college interrupted, and you learn that your son-in-law might have to work for a year for $21 a month and you would get your daughter back on your hands, and another finds that he might possibly be drawn, himself, Congress was flooded with letters of protest. Everybody is in favor of conscription as long as someone else is conscripted. Gentlemen, those same people will

have to fight if Mr. Hitler comes, whether or not they know how, and it will be plain murder if they do not.

For the past thirty years we have bragged to the world that American industry can accomplish anything, but when we want to produce an amount that is less than 25 percent of one year's national income, it will take us from 1943 to 1946 to do it, starting now. Why?

Every manufacturer in the country has been weeping large salty tears for the last ten years that he has more plant capacity than he can use, but as soon as there is any question of producing for the government, he must build a new plant, because it might interfere with his regular production and incidentally he can secure the new plant at public expense.

There is petty haggling over prices and terms, and individual producers want to hang special conditions on their particular orders. No one can be blamed for wanting to come out with a whole skin if he takes government work, but there is a limit and they fiddle while Rome burns.

Capital wants all it can finagle and so does labor. We haven't sufficient trained mechanics. What has become of the tool-makers all of a sudden? For years the tool-makers have received very high wages per hour because they could not secure steady employment. Overnight the supply suddenly disappears, so that we cannot produce the necessary new tools in several years. Arrant nonsense! The trouble is that the individual manufacturer wants to build up an entirely new force of tool-makers for the purpose, so as not to disturb his own at all, or he wants to use his own force on government work only when they would be normally slack. If the preparedness work had the first call over everything, there would be no trouble about tool-makers, but it might hurt in other respects.

Undoubtedly there are special fields for which men must be trained, but we have always been able to train men in the past for anything and we see no reason why that should be an insuperable barrier now. Of course we must build some plants for special purposes and we must train some men for special purposes but in general we have a tremendous excess of capacity for production both in plants and man-power and if it were seriously employed as the primary instead of the secondary purpose, what really had to be done would not be grave.

How does it happen that America, all of a sudden cannot produce results? Of course we can. We just have not set our minds to it. You and I and the other fellow have not yet reached the point that we are considering our collective safety over all other questions of personal well-being. If we ever reach that point,

America will go places. There is nothing which this country cannot do, if they seriously start out to do it. So far the individual has not the right attitude of mind.

We could drift along on the present program and Mr. Hitler might get here before we were ready. If that happened, there would certainly be no democracy thereafter.

We have little fear of that because before that time would come any Administration with any courage whatever (and regardless of who is elected in November there will be no lack of intestinal fortitude) would take the bit in their teeth and start out to save us in spite of ourselves. In order to do it, they would have to adopt the same totalitarian methods which we deplore in our adversary.

America is not going to fail in the emergency in spite of all the doleful predictions of commentators. We have the resources, the capacity for production and the man-power and nobody is going to lick us, now or any other time.

We have no desire to fight and we are not going to fight unless someone makes us but we cannot just ignore the possibility that we might be forced, and lazily drift with the current, knowing that we will get where we are headed eventually. We are in a race whether or not we chose to be and under the circumstances the only thing to do is to try to win it, even if it does entail some strenuous exertion, personal discomfort and even some strained hearts. Any crew man will tell you that it is a lot easier to hold one's position in the lead down the course than it is to regain a length of open water at the finish.

We will come through. The only question involved is whether we do it voluntarily or involuntarily. Unless the average individual changes his basic attitude from one of wondering how much it is going to cost him personally, and how much it is going to interfere with his comfort, and even what he can make out of it to his own advantage, to an attitude of what can he do to help along the game, then it will have to be done involuntarily.

We would be heartily in sympathy with that alternative if it proved necessary but we would regret the necessity. Of course it would start out with the premise that it would only be temporary but rights of the individual have been hard-won throughout history and it is a lot easier to surrender them than it is to get them back again.

The only way to insure the continuance of democracy is for each individual to quit thinking about his own personal advantage or disadvantage and start thinking about what he can do to help. Come on, America, let's Go. Let's show them that democracy both can and will function, if the people are back of it.

A Course *of* Study *for the* Electroplater

By DR. C. B. F. YOUNG
Head, Institute of Electrochemistry and Metallurgy, Consultant
New York City

FROM time to time I receive letters from schools and organizations concerning a curriculum for the electroplater. Several librarians of different branches of the American Electroplaters' Society have asked me for information concerning the subjects which I teach to the men in the field. For these reasons a paper has been prepared on the subject above.

It should be kept in mind that this subject is discussed with the idea that the student taking such studies is working in the field during the day. This being true, his background is generally limited with regard to scientific training but he has a world of practical experience.

The men I teach at the Institute of Electrochemistry and Metallurgy, New York City, come from the New York area. This includes a radius within thirty-five miles of New York City.

In teaching courses which will materially aid the plater, the following should be covered:

I. Chemistry
II. Electrochemistry and Electrometallurgy
III. Research
IV. Metallurgy and Metallography

At present there are several places where a plater can obtain help in the form of education in the field of electrometallurgy. I have had a chance to investigate some of these. In most cases it has been found that certain subjects have been overemphasized and others neglected. As a glaring example of this, the analysis of solutions time and time again have been stressed by different classes while the fundamentals of electrochemistry as applied to electroplating have not been mentioned. In the humble opinion of the writer some classes have overemphasized chemistry and neglected electroplating. There is one school known to the writer where two years of chemistry precedes one year of electroplating.

Of course, such a schedule will kill the interest of most platers who attend classes in the evening from 7:00 to 10:00 o'clock after working eight to ten hours during the day in a plant.

Another criticism which has come to the attention of the writer concerns the instructor. It has been said that the man teaching electroplating knew chemistry but did not know electroplating or vice versa. In either case a bad situation arises.

With these criticisms in mind, the four headings listed above will be discussed at length. Chemistry is the backbone of electrochemistry, and therefore a working knowledge of this study is essential. However, the subject should be limited so that only material of direct connection with electrochemistry need be taken up. Thus, the electroplater has very little reason for studying the gas laws, osmotic pressure, radio activity, etc. These and related subjects can be omitted from such a schedule. The period allotted to chemistry can be two evenings per week for either eighteen or thirty-six weeks. If there is to be very little instruction in qualitative and quantitative analysis technique, the shorter period will suffice. The subjects discussed in the lecture should touch on the following points: chemical changes; elements and compounds; oxygen; hydrogen; water; two oxides of carbon; nitrogen; Dalton's theory; Symbols, formulas, and Valence; chemical equations; chemical computations; common salt, chlorine, and hydrogen chloride; acids, bases and salts; molecular weights; sulfur and the sulfides; oxides of sulfur; solutions; suspensions, emulsions and colloidal solutions; determination of atomic weights and formulas; ammonia and ammonuim compounds; nitric acid and the fixation of nitrogen; ions and electrons; ionic reactions; sodium and potassium compounds; the halogen family; the new periodic law; the phosphorus family; magnesium and calcium; aluminum and silicon; iron and steel; iron family; zinc, tin and lead; copper, mercury, and silver; chromium; cadmium; gold; silver; platinum; palladium; rhodium; etc.

A good schedule to follow consists of lecturing one hour each evening and then adjourning to the laboratory. The student learns more by performing and writing up his own experiments. The experiments should serve to illustrate the subject matter discussed in the lectures.

If a short term in chemistry is to be given, the last three weeks should be devoted to qualitative analysis where the student is introduced to the different groups in the lecture and then works on an unknown in the laboratory. If this can be finished in time, one experiment each should be run in gravemetric and volumetric analysis so that the student will at least be introduced to analysis of solutions. If the longer course is given, more time can be spent on each subject and the qualitative and quantitative analysis periods can be enlarged.

On completing the above, the student is now ready for the electrochemistry and electrometallurgy course. This should take at least thirty-six one hour lectures and thirty-six laboratory periods, each period being three to four hours in length. In the lecture, the following subjects should be discussed: definitions; Faraday's two laws; current efficiency; electrochemical equivalent; single electrode potential; electromotive series; conductivity and resistivity; electron flow; oxidation; reduction; decomposition voltage; polarization; passivity; throwing power; factors affecting electrodeposits; Bancroft's axioms; Metal Cleaning; sequence of cleaning; sources of power; bus bars; racks; tanks; plating to specification and methods of checking; the deposition of copper, nickel, cobalt, chromium, zinc, cadmium, tin, silver, gold, platinum, palladium, rhodium; the deposits of brass and the anodizing and coloring of aluminum.

The laboratory period accompanying these lectures should be utilized by the student in performing at least seventeen of the following experiments: Faraday's Laws; current efficiencies; effect of temperature upon deposits; same for current density; single electrode potential; pH; the resistance of plating solutions; thickness of metallic coatings; throwing power; brighteners; deposition of alloys; anodizing and coloring of aluminum; detection of impurities in plating solutions; corrosion tests; microscopic analysis of electrodeposits; analysis of the following solutions: acid and cyanide copper, nickel, acid and cyanide zinc, brass, cadmium, tin, silver, chromium, gold, and rhodium.

A written report on each experiment should be turned in by each student. This helps to clarify issues in the student's mind and also aids in helping the student later on in his work by having a complete record handy at all times.

After completing the above, the student is now ready for a research course. I know of no better way to introduce a man into the intricacies of a science than by research. This cannot be obtained by listening to lectures or by following "cook book chemistry." The method used at the Institute of Electrochemistry and Metallurgy consists of the instructor's helping the student to find a "workable" problem. A method of attack is outlined and the student "digs in." At least twice a month an oral report is given to the instructor who in turn suggests other methods of attack. At the end of the term or the year, the completed work is written up and published in one of the periodicals. This procedure is working out very well at the above-named school. Either thirty-six or seventy-two periods of four hours each can be devoted to this study.

Due to the importance of metallurgy to the electroplater, this study can be incorporated in such a curriculum. Thirty-six one hour lectures should be devoted to metallurgy and thirty-six four hour laboratory periods to metallography. The student should be introduced to the structure of metals and alloys, taking into account the factors which affect these, namely, temperature, mechanical working, etc. The application of the phase rule to physical metallurgy should be discussed. A study of binary and tertiary systems should be studied and illustrated. The subjects of heat treating, surface treating, and testing of metals and alloys should be fully covered.

The course in metallography should be designed to teach the student the preparation of metallographic samples for microscopic examinations and the proper use of the microscope in examining said specimens. Several alloys and metals should be prepared and then examined with a microscope. The effect of heat treating, cold working, and chemical composition should be noted by the student. He should be taught to detect faulty alloys and metals by such examinations. Both ferrous and non-ferrous metals should be studied. It must be kept in mind at all times that both metallurgy and metallography should be taught from the point of view of electroplating.

The above is merely an outline by the writer and in many cases such a course of study will be unsuited. However, with such a basis a group of courses can be outlined by a competent instructor.

Some Common Health Hazards *in the* Electroplating Industry

By H. G. DYKTOR
Chief Engineer, Bureau of Industrial Hygiene, Michigan Department of Health.
Presented before the Grand Rapids Branch of the A. E. S. on February 8, 1940.

SINCE everyone here is closely connected with the electroplating industry it will not be necessary for me to recite the various steps necessary in electroplating any metal article. I will say, however, that the actual electroplating is only a very small part of the sum total of the work necessary to produce the finished plated article. I am not, at this time, concerned with the physics or chemistry of electroplating but merely with some of the health hazards encountered in the industry due to the chemicals and other materials used in production.

To simplify the discussion I propose to divide the hazards arbitrarily into two parts; those arising from the use of the chemicals and those from dusty operations.

The most widely known hazard in the chemical group is that due to the use of chromium and its compounds in electroplating, particularly the compounds of hexavalent chromium which have a harmful effect on the health of the worker. This hazard has been known for many years because the results were visible and easily detected on the individual and thus attracted the attention of physicians and others.

Cases of systemic poisoning of chromium plating workers are not known but, on the other hand, it is widely known that chromic acid attacks the skin through a break in its continuity. The slightest cut or abrasion will provide a port of entry especially in places where the skin is thinner, as over the knuckles or between the fingers. Such attacks result in the well-known chrome ulcers which ofttimes are very difficult to treat. Chrome ulcers have also been found on other parts of the body such as the arms, hands, eyelids, toes, (particularly if the shoes become soaked with chrome water) and very rarely in the throat.

Another part of the body which is very susceptible to attack by chromic acid inhaled either as a spray from the plating operation or from the dust created in handling dry acid, is the mucous membrane lining the interior of the nose. It attacks in particular

the septum which is the cartilage dividing the nose and ulceration of this thin cartilage will result in a chrome hole. Many old timers in this industry bear such scars as silent witnesses of the lack of protection that was given them in this harmful operation.

The respiratory hazard in chromium plating is due to the chromic acid mist prevalent over electroplating tanks. In the process of electrolysis, large quantities of hydrogen and oxygen are given off at the cathode and anode and these gases rise to the surface of the tank solution in the form of a stream of gas bubbles. When these bubbles enter the air they carry with them tiny droplets of chromic acid which produces a typical mist. This mist is not always visible but if present in the air in large quantities can be detected by a tickling sensation of the nose.

In this instance as in any other hazardous operation, precautionary measures are best taken as near as possible to the point of origin of the hazard. In other words, the chromic acid mist arising out of the tank must be eliminated or substantially reduced before it reaches the breathing level of the worker. A great deal of work has been performed in experiments with exhaust ventilation of such conditions and it was found that exhaust ventilation applied through slots extending on the longitudinal sides of the tank provides the best method of control. It has also been found that for best operation the air velocity at such slots should be not less than 1500 feet per minute and that the tank should not exceed 36 inches in width. The industry has realized the seriousness of this hazard and has been instrumental in getting tank manufacturers to provide these exhaust slots and ducts integral with the tank. This is an outstanding example of complete cooperation between the manufacturer, the user and the industrial hygienist. Another method of controlling the chromic acid mist is by covering the tank solution with a layer of coal oil or kerosene. This method is rarely found today because it has several drawbacks—the most important one being that it requires very skillful manipulation of the objects dipped for plating as otherwise during the process of immersion they become coated with kerosene before plating and this film may interfere with getting perfect plating results. Minor drawbacks are the continual maintenance of a sufficiently deep layer of kerosene and the danger of fire.

Medical research cooperating with engineering research has set the threshold limit for a safe concentration at one milligram per

ten cubic meters of air, which corresponds approximately to the amount of air a man breathes in the course of eight hours' work. Any concentration over this amount will probably give rise to the ill effects mentioned before. The precautionary measures include also such items as personal hygiene, protective creams and protective clothing but these I will discuss later because they are applicable to all hazards met with in the electroplating industry.

Another hazard is due to the use of cyanides in the plating of copper, cadmium, zinc, silver, gold and brass. A danger exists wherever cyanide in any form may possibly be mixed with acids or acid solutions through carelessness but this danger is well known to all platers and the necessary precautions are taken so that acute hydrocyanic acid poisoning is a rarity among electroplaters.

The other common constituents of the plating solutions are not known to give rise to any particular health hazard. For instance, nickel itch is as old as nickel plating itself. Cadmium and zinc oxides or fumes may be toxic if breathed in sufficient quantities but no such cases of poisoning of operators doing cadmium or zinc plating have been reported in the literature.

However, when we get into the operations of degreasing metal articles prior to plating and into such finishing operations as lacquering, we may run into some serious hazards. Both trichlorethylene and carbon tetrachloride are used in removing traces of oil and grease from articles about to be plated and both solvents are harmful to the worker. Both solvents have a deeply narcotic effect on the subject if breathed in high enough concentrations and for long enough periods. They may result in death even some days after the exposure. Carbon tetrachloride will produce chronic poisoning and the symptoms for it are many, including nausea, vomiting, loss of appetite, colic and constipation. Visual disturbances, blood changes, liver damage and jaundice were also reported in some cases. The foregoing will suffice to show that protective measures are necessary when either solvent is used.

Degreasing should be done in totally enclosed systems which will afford the best solution of the problem. However, this is not always possible and specially built tanks are made in which the danger is fairly well controlled if the manufacturer's instructions are strictly followed. Sometimes all this is done very religiously yet no attention is paid to the location of the tank in respect to other pieces of exhausted equipment located in the same room or

near to the degreasing tank. It must be understood that strong currents of air produced in the room by exhaust ventilation must not be allowed to interfere with the delicately balanced control of these degreasing tanks and if this operation cannot be segregated it should at least be protected by large shields.

In the case of lacquering, the problem of toxicity of lacquers is becoming increasingly complex. Organic chemists are developing new substances every day, many of which are used in modern lacquers. Unfortunately, little or nothing is known about the toxicity of these compounds. Moreover, speedy methods of application such as spraying or dipping have eliminated the slow hand brush application. These new substances together with new methods have enormously increased the difficulty of determining the possible health hazards in lacquering. A thorough discussion of lacquers is beyond my knowledge and I do not believe that it would be of particular interest to this group. However, as a general statement it can be said that for all practical purposes the toxicity of a lacquer depends chiefly on the evaporation of its volatile fraction. This volatile fraction which makes up some 75 to 93 percent of the weight of the lacquer is composed of various solvents and thinners. These may be divided into five classes:

1. Esters, consisting generally of the well-known acetates like amyl, butyl and so on.
2. Ketones, including the comparatively harmless acetone.
3. Ethers which are very toxic.
4. Hydrocarbons, such as petroleum, naphtha, benzol, toluol, xylol, etc.
5. Alcohols.

Now let me say a few words about controlling these potential hazards. Since the usual route of absorption of volatile substances is through the lungs, it is necessarily important to minimize the concentration of vapors in the atmosphere breathed by the worker. It should be realized that in discussing the toxicities of the volatile lacquer components that, in general, the toxicity of each is a relative matter. It should be remembered that any volatile organic material will produce narcosis or asphyxia if present in sufficiently high concentration. In general, also, it may be stated that protective measures which eliminate the hazards due to the volatile portions of lacquers will automatically avoid

any possible danger from toxic pigments and other non-volatile substances.

Much can be accomplished in lacquer hazard control either by the elimination of certain toxic substances or by reducing their percentages in the lacquer. Manufacturers have been able to eliminate benzol and methyl alcohol through substitution of less toxic solvents from almost all formulas; however, still more work along this line could be accomplished. It should be possible, by proper research, to avoid the use of the more toxic substances and still retain the quick drying properties and the desirable characteristics of the coated film. In addition, the toxicity of new substances which are constantly being introduced into manufacturers' formulas should be investigated so that proper precautions to protect the health of the industrial worker may be taken. After substitution, which is usually a duty of the manufacturer since the user has neither time nor facilities for the necessary research, comes ventilation.

Adequate ventilation is the most effective means of control of the health hazards and also results in proper control of the fire hazard. Hose or pressure type masks can be used, and may be required in addition to ventilation but they should not be used in place of adequate exhaust equipment.

Spray coating is fast becoming standardized by the use of properly designed spray booths. A distributed minimum air velocity of 100 feet per minute is generally provided although higher velocities are necessary when highly toxic materials are used.

Dip tanks may be ventilated by general mechanical ventilation. Twelve air-changes per hour have been recommended. Such tanks may also be ventilated by a lateral exhaust system slightly above the surface of the liquid in the tank. A combination of the two methods may be necessary.

Among the less common hazards there are a number of unusual ones, at least unusual in the plating shop and it is well that the plating industry knows of the possibilites. The use of electrodes or of substances chemically impure in electroplating may expose the workers to poisoning from various substances. Poisoning may occur from mercury, lead arsenic and antimony. Thus, for example, in Great Britain, between the years 1900 and 1919, seven

cases of poisoning from arsine (AsH_3) which is given off when metals containing arsenic are dipped in acids, were reported.

Lead electrodes are used in chromium plating. Frequently, lead chromate is formed on the surface and if these anodes are brushed dry, this compound will be scattered as a dust. The use of wet cleaning methods will avoid this possible lead hazard.

Infrequently, a solution of ammonia and water is used as a rinse after an acid dip, especially in jewelry plating. Also, it has been found that under certain conditions, ammonia is given off from electroplating baths containing cyanides, evidently as a reduction product of cyanide. This gas is colorless but has a strong pungent odor. It is strongly irritating, affecting exposed mucous membranes, eyes, throat and upper respiratory passages. Such situations can be corrected by proper and adequate ventilation.

Now, a few words about acid mists, vapors and gases. Acids are rather common substances around the electroplating plant and because familiarity breeds contempt, they are apt to be considered as innocuous materials. It should not be forgotten that solutions of acids, such as sulfuric and hydrochloric, give off vapors and that the concentration of these vapors will depend upon the nature of the acid, the area of the surface exposed, movements of air in the room, the concentration and the temperature of the the solution. In addition, disturbance of the solution by dipping objects in the tank, or by gases caused by electrolyzing, will create mists which increase the concentration of the acid in the air inhaled by the worker.

In general, acid vapors and mists irritate the respiratory tract. With increasing concentration or repeated inhalations, chronic irritation is manifested by inflamation of the eyes and throat, sneezing, bronchitis and sometimes hemorrhages in the lungs and digestive tract.

The use of nitric acid may be even more harmful than the more familiar hydrochloric and sulfuric acids. Its harmful action must be considered when it is used. The pure nitric acid vapor has a local action on the skin and mucous membrane. The great danger of nitric acid arises from the development of what are known as "nitrous fumes" (nitrogen oxide and dioxide, etc.) Whenever metals are treated with nitric acid, or in a mixture which contains

nitric acid, there is a probability of the evolution of the light yellow to dark brown "nitrous fumes." These fumes have a local irritating and corrosive action on tissues and more especically on the respiratory and digestive mucous membranes. Even if a dangerous concentration exists the local symptoms may pass unnoticed or are so slight that the worker has little or no warning of the highly dangerous atmosphere which he breathes. Later, after an interval of several hours, the full development of the symptoms takes place, with death as a possible final result.

This brief discussion is enough to indicate that these acids may give rise to harmful concentrations of vapors, mists or gases and some control method should be used to insure that the workmen are not forced to breathe hazardous concentrations of toxic materials.

The method by which this can be accomplished will depend on a number of factors, some of which were mentioned, and should be adapted to the particular set-up. Since this is the case, specific recommendations cannot be given but among the methods available are local exhaust ventilation, general ventilation (natural or forced) and segregation (total or partial). The Bureau of Industrial Hygiene of the Michigan Department of Health is available for consultation on problems of this type and will be glad to aid all those desiring such assistance.

I shall now discuss the dust hazard but before doing so I think it may not be amiss for me to say a few words about the cause of the well-known dust disease, silicosis. To begin with, silicosis is a disease of the lungs resulting from the inhalation of dust containing free silica. Most of the crust of the earth contains the element silicon and it occurs as silicon dioxide. In the majority of cases it is present in the chemically combined form called silicates such as in talc, gypsum, soapstone and like minerals. The part that affects the lungs is free silica, not combined chemically with other elements, and it is present in varying percentages in such minerals as flint, quartz, granite, tripoli, etc.

Silicosis is not produced as a result of an occasional or temporary exposure to dust containing free silica. It comes as a result of breathing large quantities of dust containing substantial percentages of free silica over extended periods and the length of exposure is very important when the percentages are low. To be

specific, if the dust contains five percent or less of free silica, concentrations of fifty million particles per cubic foot are permissible but if the percentage of free silica rises to thirty-five then this concentration must be reduced to about ten million per cubic foot and if the percentage of free silica is ninety then the permissible dust concentration must be kept down to the level of five million particles per cubic foot. These limits have been established as a result of extended medical and engineering studies and they do not mean that the men breathing or working in air containing occasionally more than these amounts will be taken ill but they do mean that if these limits are not exceeded the workers will not suffer from silicosis.

I have taken time out to say a few words about silicosis because there is a great deal of misinformation floating around particularly in the electroplating industry which basically cannot be called a dusty industry. However, metal polishing and metal buffing have long been suspected as hazardous occupations due to the dust which is caused by the operations. Of course, they are bound to be dusty, if only due to the lint thrown off from the wheel. In addition, the processes usually make use of polishing or abrasive agents. Deep scratches or blemishes on the metal require rather severe abrasion before the final polishing compound is used to give luster.

The polishing or abrasive agents used commonly are emery, tripoli, pumice, lime and rouge. With the exception of emery and pumice, these abrasives are incorporated in various greases, such as stearic acid, tallow, paraffin and petrolatum. The grease serves as a binder and permits the polishing material to be applied and to stick to the buffing wheel without flying off. It is the polishing agent which does the work of polishing, the buff acting merely as its conveyor.

A consideration of the composition of polishing agents shows that most of them are harmless so far as liability to cause silicosis is concerned.

Emery, for example, is a silica-free material composed essentially of aluminum oxide and magnetite.

Carborundum, or silicon carbide, does not contain free silica and is not known to cause silicosis. The same is true of aluminum oxide.

Red rouge or red iron oxide (Fe_2O_3) which is used principally for producing "color" on gold and silver was found by Miller and Sayers of the U. S. P. H. S. to be an inert dust when injected into the peritoneal cavities of guinea pigs. That is, it produced no fibrotic reaction in the abdominal cavity and by inference would not produce any in the lungs. There is no evidence on record to show that the dust of this material has produced pulmonary disease.

For producing "color" on metal surfaces such as nickel, copper and brass a high magnesium lime is commonly used. Men sometimes complain that the lime dust is irritating to the eyes and upper respiratory tract. Lime, however, has no fibrosis stimulating effect upon the lungs.

The most widely used polishing agent is tripoli, a porous, siliceous rock resulting from the natural decomposition of siliceous sandstone. It may be either amorphous or minutely crystalline, a form for which the term "cryptocrystalline" is used. Its sources in this country are in southern Illinois and southwestern Missouri. It has been found that tripoli, when injected into the peritoneal cavities of guinea pigs, produced a reaction characteristic of quartz; one that would presumably indicate an ability to cause silicosis. In fact, however, silicosis has seldom been ascribed to it.

Occasionally bricks are used in buffing to "open up" the emery surface of the wheel, in other words to create a fresh abrasive surface. The brick dust which is formed may contain free silica, especially if the bricks are of the refractory type. This particular exposure, of course, is brief, but the concentration of dust may be high if no exhaust ventilation is provided.

A recent study indicates that a slight silicosis risk exists among metal polishers. It was shown that tripoli is the important siliceous substance to which polishers are exposed and that in this industry it is incorporated into a greasy medium materially reducing its dustiness.

Because of this slight silicosis risk and primarily because of the nuisance nature of polishing dusts, it is essential that the concentration of dust in the atmosphere breathed by the workers be kept at a minimum. This can be done by first segregating these dust producing operations from the plating processes. Such separation is advantageous from an operating as well as a health

standpoint since it avoids contaminating the air breathed by the platers and the plating solutions with dust. It also avoids fumes, mists or gases from the plating room collecting in the polishing room and causes tarnishing and corrosion of the work.

As further protection, all wheels should be hooded and exhausted to keep down dust concentrations to acceptable low levels. The dust should be collected in an arrester and not permitted to escape into the free air and create a dust nuisance for neighboring plants or residences. The arresters should be cleaned out at regular intervals and the entire dust collecting equipment maintained in good condition as recommended by the manufacturers of such equipment. Expensive control equipment should not be allowed to become inefficient through neglect of proper maintenance methods. For instance, chromium plating tanks are almost invariably exhausted and provided with ducts, exhaust fans, etc. Observation has disclosed a pitiful condition in quite a few instances. Ducts were perforated, blades missing on fans, etc., all due to lack of maintenance.

It might not be amiss to say a word or two concerning the undesirable habit on the part of some workers to remove the exhaust hood from the wheel. With some it has become second nature to do so on the slightest provocation and they thereby destroy the sole protection that can be provided to shield them from respiratory disturbances produced by high concentrations of dust. With others the reason for such hood removal is founded on better premises. It is readily admitted that some products or pieces are so intricate and clumsy to handle that the hood is in the way if the man has to thoroughly polish or buff his work. If that is the case then it is believed that the hood should be redesigned and relocated but not eliminated. With the exercise of a little ingenuity and thought it will be found possible to solve the problem in a comparatively simple manner. It must be remembered that the main purpose of the hood is to enable the suction to be brought as near to and as completely around the dust producing source as possible. Taking this hood away, and merely leaving an open end of the suction pipe some two or three feet away from that source, will not keep the dust concentration down.

If sandblasting is to be done on the premises it is strongly recommended that totally enclosed cabinets be used.

Now what more is it that we can do to protect the worker against these health hazards? It is not an easy matter to be specific because of the great variety of materials used but there are a few recommendations that can be made and they are basic to all plants.

First of all, steps should be taken to substitute nontoxic materials for toxic ones. If that is not possible then all toxic vapors, mists or dusts must be removed as closely to their point of origin as possible and before they reach the worker's breathing level. Another method is to segregate or enclose toxic processes so as to involve as few workers as possible because the smaller the number the more practical and economical the control methods.

There are four recommendations, however, which can be applied to this industry as well as to any other and I am going to discuss them because to my mind they are most important because of their general application.

1. Personal Cleanliness
2. Good Housekeeping
3. Intelligent Use and Maintenance of Protective Equipment
4. Healthful and Sanitary Surroundings

Under the heading of personal cleanliness I might say that it is one of the best preventive measures in warding off disease but it must be carried out continually and become second nature to the individual worker. A certain routine must be set up so that the worker may practice it not because he is so ordered but because he is convinced that it is necessary to do so to protect his own health.

The Division of Labor Standards of the Department of Labor has stated five brief rules. They are:

1. Wash and dry hands at least at noon and after work.
2. Use showers after work if available and wash thoroughly.
3. Wear gloves, aprons, boots and other protective equipment.
4. Have separate work clothes and keep them clean.
5. Apply for first aid immediately for any cut, scratch or skin infection regardless of how slight.

A few words of caution may be added. Rubber gloves, aprons and boots are particularly recommended for chromium platers

but it may so happen that, in raising dipped objects to a rack, the solution will run off the glove onto the arms and, when the hands are lowered, the solution will find its way inside of the gloves. The solution likewise may drip from a rubber apron into the boots. Thus, instead of such clothing protecting the skin, the gloves and boots may become veritable compresses. The use of long India rubber gloves, maintained in good condition, with shirt sleeves buttoned at the wrist over the gloves and the use of snugly fitting boots will avoid these difficulties.

A fully equipped first aid cabinet should be provided and it may contain a protective ointment such as a mixture of petrolatum and lanolin. However, self medication or treatment must not be practiced but a physician consulted whenever an unusual condition arises or a doubt exists.

Under the heading of personal protection comes the use and maintenance of respirators. There is too much confusion on this subject in the minds of many people and a brief discussion may be enlightening.

There is a time and place for a respirator but in no instance can its use be substituted for proper ventilation. Respirators are only suitable for short exposures or in places where it is economically impossible to provide the required exhaust equipment.

Great care must be exercised in the selection of respirators since they are not interchangeable in their uses as a protection against dust, organic vapor or gas. Respirators should be bought and used for one definite purpose only and should bear the approval issued by the U. S. Bureau of Mines for that specific hazard. Unapproved respirators may be of little value and may afford a false sense of protection.

Respirators require maintenance just as any other protective equipment. They should be cleaned thoroughly every day and filters changed as often as is necessary. Every man should take care of his own personal respiratory equipment and be encouraged to perform this routine daily.

The use of handkerchiefs and similar home-made devices for respiratory protection should not be permitted. They afford no protection and can serve only as a warning for the need of controlling a hazard. This control should be provided in the proper manner.

Cooperation between the worker and the employer must be insisted upon and there is hardly a more suitable place for cooperation than in the use of protective equipment. Good economics requires that the employer provide such equipment for the protection of his worker's health while the spirit of self preservation and common sense require that the worker avail himself of and use the equipment provided by his employer, often at great expense.

I have mentioned good housekeeping because I am of the opinion that good housekeeping will result not only in more healthful working environment but increase the efficiency, promote contentment and improve the morale of workers and make the difference between a well kept and a neglected work room.

Good housekeeping cannot be emphasized too strongly. A clean, orderly, well lighted and well ventilated plant is heartily to be desired and can most easily and inexpensively be attained.

Cleanliness involves avoiding accumulations of dirt, paper, wet and dirty sawdust, etc. Unnecessary accumulations of scum, acids and grease should be avoided. Material should be transferred from tank to tank and from tank to rack with a minimum amount of dripping. Clean sawdust should be strewn and old sawdust removed daily in the vicinity of sloppy operations. In the polishing and buffing rooms, dust should not be permitted to accumulate on the floors, equipment or benches. It should be swept daily after sprinkling water or distributing wet sawdust. Dust which is permitted to accumulate on floors, beams, equipment, etc., will be jarred loose by vibrations and drafts and will be added cumulatively to the daily dust load in the room and produce unnecessary and perhaps harmful concentrations.

Floor grids, elevated from the floor, should be provided around the tank and should be washed daily. This will prevent stagnation of water and slopped-over acid around the tanks, reduce slipping and prevent acid getting onto the feet and clothes of the workers. All grids should be at the same level to prevent stumbling.

It is most advisable that the floor of the plating room be made of concrete and so provided with gutters as to quickly drain. Before emptying into the city sewer it may be necessary to trap the waste or otherwise conform to existing ordinances.

In addition to the foregoing, good housekeeping includes a proper arrangement of the tanks and other equipment, a method

of keeping materials and tools in a special place and storing other materials in such a manner that will be orderly. It also includes proper illumination, proper seating arrangements and a good natural ventilation for the workroom because of the high temperature of some of the baths, the quantities of hot and cold water used, etc., which contribute to a high humidity and make working conditions trying even under the best conditions.

Care should also be taken of the sanitation of the plant and this includes adequate toilets, proper washing facilities with no common towel, approved drinking water arrangements without a common cup, etc. Locker rooms also should be provided so that the workers can change and store their clothes and if any cafeterias or lunchrooms are provided they should, of course, be operated in a sanitary manner and serve pure wholesome food. While on the subject of eating places, may I say that eating and smoking should be prohibited in the workroom because of the highly poisonous qualities of the materials and solutions used in the electroplating process.

In conclusion I must say that, speaking from my own experience, I have found the industry, as a whole, very cooperative and very desirous of coping with the solution of its health problems. I did find, however, that a few were misinformed, a few did not maintain their protective equipment as well as they should but, as I said before, as a whole, they did wish to eliminate their health hazards.

Merely to provide protective equipment is not enough and it is incumbent upon the employers to acquaint their workers with the reasons for the installation of such expensive protective equipment. It is one of those situations when there must be intelligent cooperation between management and the worker. The management buys and installs the equipment but the worker must be taught the reason for such installation and must be taught how to use it. Good habits must be created slowly and patiently so that they will become second nature to the man and will not be carried out just because of fear of losing his job. Everybody must be convinced that the protective measures taken are for the good of all and that good habits must be maintained all the time because sporadic and intermittent efforts will not prove satisfactory in the long run.

Some Odd Colorings *on* Brass, Copper *and* Copper Plated Goods

By T. A. GARDNER

From THE MONTHLY REVIEW, June, 1927.

THIS is a paper which was presented at New York City, by Mr. Thomas A. Gardner, trustee, and read by President F. J. MacStoker of the New York Branch of the A.E.S., and being the very first paper presented by these two brothers in trade. Since then the paper has been revised by T. A. Gardner after receiving advisement to do so by F. J. MacStoker, so that all could get these colors. These colors may not be new to all the brothers of the A.E.S., but to some of the brothers they are new.

We use these on expensive articles or if a sample is submitted, they will be of value, as through these solutions I have finished the following different colors, black, greens, browns, statuary, orange, purple, reds, and a very nice gray on silver. I am experimenting with these solutions to see if they cannot be brought up to use as commercially as our other bronzing solutions. So far my present employer has a sample board with twelve (12) different colors to show purchasers of lamps.

Presenting here the rules to follow:

Do not use too much chemical. Waste of chemicals, and we don't as far as I have seen from my experimenting receive a durable finish, it seems to be softer. I believe the reason for this is too much free sulphuric acid which has a tendency to soften and remove the color after one day's run is finished.

Use about, on average to gallon of water, 9 ozs. of chemicals. The manipulations of working is another thing we must follow.

Another factor to consider at all times is not to get in too much ferrous (iron) sulphate as it is a more active metal than the copper sulphate and it has the tendency to destroy, as far as my experimenting, the color, and leave the copper showing either in spots or all over article to be finished.

The following colors were produced with following solutions, but you can obtain several other colors from it, dark brown, light brown, green, and orange. To get dark brown, first acid copper

plate article, brush with pumice and water then put through solution composed of

Copper sulphate	4 ozs.
Potassium chlorate	1½ ozs.
Single nickel salts	2½ ozs.
Iron sulphate	1 oz.
Water	1 gal.

To get dark shades of brown, brush and run through formula given three times.

For lighter browns, cyanide copper plate for ten (10) to fifteen (15) minutes, brush and run through one or two times.

For greens, do these colors on brass direct, the dark green is produced after brushing twice, light green once.

The following solution used gives browns, black, and statuary bronze color.

Copper sulphate	4 ozs.
Potassium chlorate	1 oz.
Single nickel salts	1½ ozs.
Acetate of copper	1¼ ozs.
Ammonium chloride	1 oz.
Hyphosulphite of sodium	2 P ozs.

For antique green colors from light to dark, on brass which is a very good finish with a smut of lighter greens in crevices. This is used mostly for brass articles where there are several high lights:

Hyposulphite of sodium	6 ozs.
Single nickel salts	1 oz.

The following formula gives various shades of chocolate browns, dark to light, lavender, reds. Acid copper plate for dark chocolate brown, with brushing same as first. Lighter browns are produced after cyanide copper plating reds on brass or copper. Lavender color is produced after acid copper flashing. This is a formula I used to experiment with and is a very complicated one.

Sodium hydrate sticks	¼ oz.
Copper sulphate	3 ozs.
Hyposulphite of sodium	1½ ozs.
Ferrous (Iron) sulphate	¼ oz.
Lead acetate	½ oz.
Potassium chlorate	1¼ ozs.

You will please notice that the weight of chemicals is an important factor and not so much as others advocate per gallon.

First having 9 ozs. of chemicals, second 8½ ozs., third, 8¾. I make this notation so it will show just the proper amount.

These colors must be seen to be appreciated for their beauty. I showed them on a board at New York Branch banquet and several brothers looked them over and asked for the formula, so let them have them and others if they care for same.

Hoping my humble services will do somebody a good turn, as through trying to help others is the motto of all the brothers of the A. E. S. throughout the different branches, we come to better progress for good of what we are striving to do, not holding it up yourself as it was in former years.

Educational Program

The 1940-41 Educational Program is gradually getting under way.

A list of thirty-one speakers available to the Branches has been mailed to twenty Educational chairmen who have registered their names and addresses with the supreme educational chairman. Additional names will be added as they become available.

This list will be mailed to other Branches as fast as their requests come in.

It is hoped that it will be of considerable assistance in making up the educational programs for the coming year. We strongly urge all branches to heed President Fulforth's request and avail themselves of this service.

There is no longer any good reason why any branch need content itself with a mediocre educational program with so many excellent speakers available. We express our sincere appreciation to all who have so willingly agreed to assist in this service for the coming season.

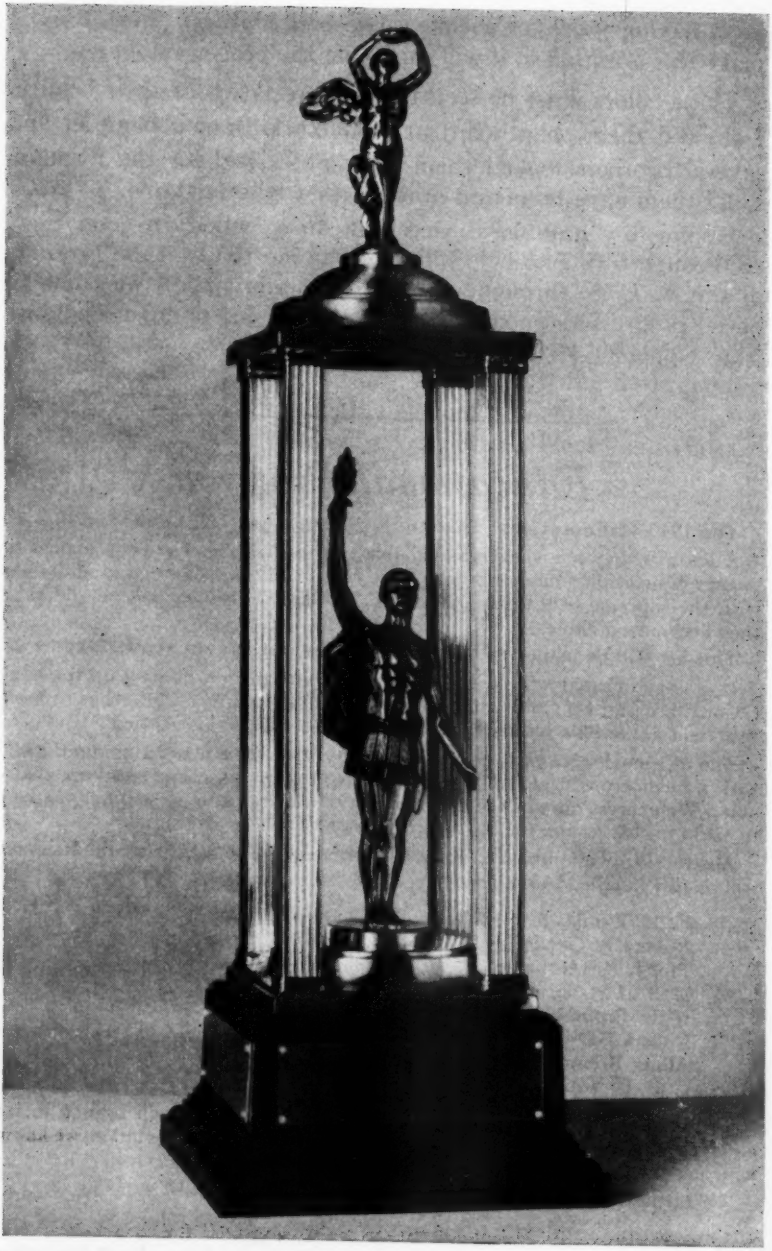
Abstracting of all published material of interest to the A.E.S. for the REVIEW will be ably handled by the following men:

E. H. Lyons, Jr.
Robert B. Goodsell
Phil J. Ritzenthaler
D. S. Hartshorn, Jr.
N. E. Promisel
Robert B. Sizelove
Abner Brenner
C. B. F. Young

Your supreme educational chairman is anxious to help each branch in its educational work as much as possible. It will be hard to do this unless we know your needs and desires.

We earnestly invite your correspondence.

C. C. CONLEY,
Chairman, Educational Committee



A. E. S. Membership Trophy

RULES FOR MEMBERSHIP CAMPAIGN

1. All Branches of the Society at the beginning of the fiscal year are eligible.
2. Membership shall be based on the correct list of the Executive Secretary at the beginning of the fiscal year. Any corrections in the 1940-1941 membership lists must be made by October 1, 1940.
3. A monthly report of the progress of the campaign shall be made to the membership chairman of each branch each month and shall appear in the MONTHLY REVIEW.
4. Monthly progress reports shall be based on the branch reports mailed to the Executive Secretary not later than the first day of each month.
5. Changes in membership shall be calculated as percentage changes based on membership at the beginning of the fiscal year.
6. Changes in membership by elections, suspensions, resignations, reinstatement and death shall be given full credit. Changes in membership by transfers shall be given half credit.
7. An award to be known as the A.E.S. Membership Trophy will be awarded to the branch securing the greatest percentage increase in membership for the fiscal year.
8. The trophy is to be awarded each year. A branch may win the trophy more than one year but is not to retain permanent possession.
9. The Branch Secretary shall be responsible for the trophy.
10. The trophy shall be presented to the winning branch at the first business session of the Convention.

PAPERS FOR PUBLICATION IN THE REVIEW AND A CASH PAYMENT

Since we are getting short of papers for publication in the REVIEW, we are asking our members and friends to send us articles of interest to our readers. These contributions need not be long, but we should have enough of them so that we will not need to make continual appeals. No cash prize will be offered this year for the best paper presented as was done last year. Instead the Executive Board has decided that a cash payment be made to the author for the best paper published in the REVIEW each month.

A committee will be appointed by President Fulforth to decide on the merits of the papers published. After their decision has been announced, a check will be mailed to the winning author.

Many of our members have articles of interest that they have been waiting for an opportunity to publish. Now is your chance. Plating, polishing and lacquering problems and how they have been solved, solution control, cost reduction, engineering, equipment, methods of production, and chemistry classes are topics that might be used in the presentation of papers.

WHY NOT HAVE A BETTER REVIEW

The question "What to do to Better the REVIEW" is in urgent need of attention from every member of the Society. After all, The REVIEW is *our* paper —its value will always be in direct proportion to the effort of the people interested in its welfare.

In order to get an intelligent picture of what is necessary to improve the REVIEW it is first important that we know what is involved in the make up of each individual issue. The REVIEW is comprised of (1) NEWS ITEMS, (2) TECHNICAL PAPERS, (3) ADVERTISING.

1. NEWS ITEMS.

Since the News Items in the REVIEW consist primarily of the minutes of the Branch meetings, it is very important that each Branch Secretary send in his minutes an as dressy a manner as possible. Most of the articles that have been presented in the past have been stilted in form and as a result they have lost a lot of their potential interest to the REVIEW readers. It is only possible for the

Editor of the REVIEW to attend a small percentage of the meetings and for this reason the burden of "star reporting" falls to Branch Secretaries.

As a suggestion for Branch Secretaries to improve the reports of meetings, we heartily endorse the plan of including more detailed reviews of Speakers' topics and suggestions which may have come before the Branch for improving or enlarging on Branch activities. After all, it is considerably more interesting to other members to review the real meat of a Speaker's talk which may very well contain valuable information, than to read a lot of details of the business meeting. We suggest the above as an addition to the business meeting minutes rather than a substitute.

As a further suggestion toward improving this section of the REVIEW, why not obtain the services of one of your Branch members who has a flair for photography. He will gladly take a couple of pictures of Speakers, Officers, banquets, outings, etc., and the REVIEW will be considerably enhanced by the addition of a pictorial description of Branch gatherings. This improvement can be effected within the present budget of the REVIEW.

2. TECHNICAL PAPERS

Technical Papers ordinarily come from people who are willing to sacrifice their own time to have the paper published as a contribution to the Society. These papers are usually prepared by men whose knowledge of some particular subject might be interesting, as well as valuable, to the general membership. This specialized knowledge usually results from the Author's original work or broad experience on some particular subject.

Writing a paper is a little different from writing a letter — usually requires a considerable amount of time and thought in order to make the paper as comprehensive and articulate as possible. For this reason many of our members who have the knowledge, background, and information available have not been writing papers for the REVIEW because we have provided them with no incentive. The fact that we have no policy regarding the reimbursement of Authors perhaps is in some measure at fault. If we were to change the size of the REVIEW to the now considered "standard" size of most trade papers (approximately 9" x 12"), there would be immediate need for an increase in the number of quality papers available. In considering the policy of paying for Technical Papers, it is necessary to keep in mind that the REVIEW is published on a limited budget and it would require an additional income to balance the additional expense. Which brings us to

3. ADVERTISING

The most important function of advertising in any publication is the providing of the major part of the revenue. Secondly, Advertising provides a channel of information for publication readers on the latest developments in their field. The income from Advertising in the REVIEW in the last few years has made it possible for us to step up the quality of the REVIEW, and it is only practical economic sense for us to assume that the same Advertising can be responsible for even greater improvements.

And it is right here that every member can do his own individual bit to strengthen the REVIEW.

The premise of selling Advertising is pure and simple. Advertisers buy space because they want to sell goods. Naturally, they look to the most productive markets which in the field of Plating is recognized to be among our own membership. Space is paid for on the basis of QUANTITY as well as QUALITY. It, therefore, behooves each individual member to do his part in increasing the membership of the Society (and thereby the circulation of the REVIEW) so that eventually it will be possible for us to realize increased revenue from our Advertising.

The problem of a better REVIEW, finally, reverts to each Branch Office and individual member of the Society, and we sincerely urge the co-operation of everyone toward this end. We promise that any constructive suggestions offered by members will have careful consideration.

ELLSWORTH T. CANDEE
1st. Vice-President

LEA FISHING TRIP

The event was a one day's fishing trip off Freeport, L. I. We went 15 miles out in the ocean and 29 of us on three fishing boats caught 350 Bonita weighing 2 to 5 pounds each. Enclosed is a snapshot showing some members of the Platers Society who were on this trip, also showing some of the products of the trip. The two bags to the right are full of fish (believe it or not), and directly in front of the men are two big tin cans full of fish dumped out for exhibit purposes.

The names of the individuals in the order in which they appear in the snapshot are as follows:

Ed Jarm — The Lea Mfg. Co.
Verne Verzier — The Lea Mfg. Co.
R. J. O'Connor — Contract Plating
Phil Pratt — Formatic Company
G. C. Knecht — Hanson-Van Winkle-Munning
E. Candee — American Metal Hose
M. J. Kiessling — American Fastener

All of these men are members of the Platers Society excepting Phil Pratt and he is a prospect. The picture was taken by the undersigned who was also present on the fishing trip.

EARLE W. COUCH

BRIGHT COBALT NICKEL

Designed for those who require a maximum brightness. Sufficiently ductile to withstand considerable deformation without damage to plated surface. Simple, readily determined and controlled solutions with economical processing.

9H SOFT SEMI BRIGHT NICKEL

A Cobalt Nickel Process ranging from semi-bright to bright deposits, having remarkable ductility with low-cost operation and simplicity of control.

A telephone call, wire or letter will bring our representative with complete details.

HANSON-VAN WINKLE-MUNNING CO.
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#20 FLUX

#20 is the first patented flux used successfully in hot galvanizing and after nine years of increasing demand it has continued to be a major contribution to the newer and better practices in hot galvanizing.

#20 Flux has four outstanding features:

Economical

Simple to use and control

Leads to vastly improved quality of finished product

Permits appreciable dross reduction and fewer rejections due to defective or sub-standard galvanizing.

To those interested in making savings on improved galvanizing operations we will gladly send complete information on #20 Flux.

PLANTS Metuchen, New Jersey . . Anderson, Indiana . . Bridgeport, Connecticut
SALES OFFICES Chicago · Cleveland · Detroit · New Haven
New York · Philadelphia · Pittsburgh · Springfield (Mass.) · Syracuse

Chicago Branch held its regular monthly meeting at the Atlantic Hotel, July 14, 1940, with our President, M. H. Longfield, in charge of the meeting and all other officers present.

The application of Mr. C. R. Fischrupp was read, and turned over to an appointed committee for investigation.

Acting for all the Chicago delegates to the Dayton convention, Mr. J. W. Hanlon gave a most interesting and concise summary of the convention doings and papers. Considerable discussion followed Mr. Hanlon's report, and the delegates were appointed a committee to digest the various recommendations made, and to report to our August meeting for approval by Chicago Branch, in accordance with a request contained in a letter from Supreme President Fulforth, on suggestions from the various branches.

Librarian O. Weicknann then led the discussion on the inquiries found in the question box, as follows:

Q. Give best method for preparing zinc die castings for silver and gold plating.

A. To prevent adsorption, plate with nickel, then silver; for gold, after nickel, flash in brass for gold color, then gold plate.

Q. Is electro-polishing being commercially used?

A. Not to knowledge of members present.

Q. What causes peeling of bright nickel on cold rolled steel?

A. Steel is not thoroughly cleaned. One member suggested a copper deposit before bright nickel.

Q. Is it possible to copper or nickel plate over a chromium deposit?

A. Plate with copper from sulfate solution.

E. A. LANZ, *Secy.*

Newark Branch held its regular meeting on Friday evening, July 19, in the Club Room of the Hotel Douglas. As our President was on vacation, the meeting was opened at 8:45 P. M. by our Vice-President, William Bruhns. Other officers present were George Wagner, Secy.-Treas.; John Kotches and Paul Oldam, Trustees.

The Secretary stated that he had about ten letters to read, most of which had already been answered. As this was a very hot evening, a motion was made and carried that the reading of the letters be dispensed with and that the important communications be read at the next meeting.

The Secretary next announced that the date of our Annual outing was set for September 7, at Vogel's Grove, Union, N. J., and that all the members would be notified by letter.

Mr. George Reuter conducted a question box which lasted about a half hour. Only 16 members were present so the meeting adjourned at 10 P. M.

GEORGE WAGNER, *Secy.*

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Deliveries on Schedule
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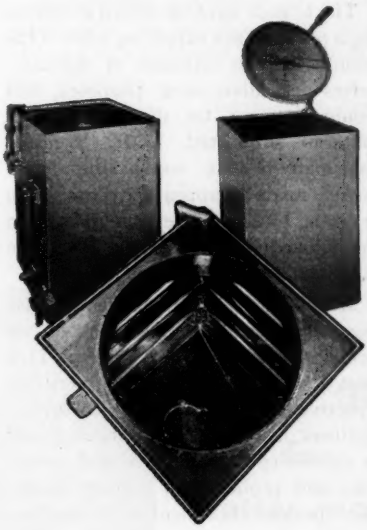
THE STORTS WAY of RINSING WITH SPRAY

MAKES EVERY DAY A COST-CUTTING PAY-DAY



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The Udylite Corp., Cleveland, Ohio
J. C. Miller Co., Grand Rapids, Mich.
Donald Sales & Mfg. Co., Milwaukee, Wis.
L. H. Butcher Co., San Francisco, Cal.
L. H. Butcher Co., Los Angeles, Cal.
MacDermid Inc., Waterbury, Conn.
Electroplating, Inc., Atlanta, Ga.
F. H. Bathke, St. Paul, Minn.

The No Obligation Booklet Telling Why, Is Yours For the Asking—Write For It WITHOUT DELAY TODAY

STORTS WELDING COMPANY

42 STONE STREET **MERIDEN, CONNECTICUT**

Manufacturers of Welded Fabrications to Specification

Cleveland Branch regular meeting was held on August 3 at the Hotel Cleveland.

The application of George P. Needham was approved for election. Leroy Camel was granted a transfer to Cleveland from Toledo. Application of John A. Vignos, Canton, Ohio, was referred to the Board of Managers.

The branch went on record as following a policy of not supplying a list of the membership to suppliers or manufacturers for advertising purposes, but would put out for distribution any material submitted. Mr. Svenson, chairman of the membership committee, made an appeal for cooperation in trying to induce the younger men in the industry to become members of the A.E.S.

Mr. Jack Hoffman of the Udylite Company furnished the speaker, an electrical engineer who talked on Dry Disc Rectifiers. He gave a very instructive talk, touching on the future of rectifiers, history of power, from steam to electricity transformers and power lines and problems in voltage drops. The speaker also mentioned applications for various sizes of plants and mentioned that rectifiers can be built at the same cost in dollars per amperage regardless of size.

His statements were very frank as to its applications and did not propose to replace all other equipment. Messrs. Scott, Hoffman, and Thompson talked on the work being done to bring the convention to Cleveland in 1942.

Mr. Singler reported the Cleveland Exhibits at the Dayton Convention as being very pleasing.

There was some discussion regarding the advisability of a manufacturer's exhibit in Cleveland if Boston decided not to have one next year.

—FRANK J. OPATRNY, *Secy.*

YOUR JOB

From the Supervisor

Wherever you're working—in office or shop
And however far you may be from the top—
And though you may think you're just treading the mill,
Don't ever belittle the job that you fill;
For however little your job may appear—
You're just as important as some little gear
That meshes with others in some big machine,
That helps keep it going—though never is seen.

They could do without you—we'll have to admit—
But business keeps on, when the big fellows quit!
And always remember, my lad, if you can,
The job's more important—(oh yes) —than the man!
So if it's your hope to stay off the shelf,
Think more of your job than you do of yourself.

Your job is important—don't think it is not—
So try hard to give it the best that you've got!

And don't think ever you're of little account—
Remember you're part of the total amount.
If they didn't need you, you wouldn't be there—
So, always, my lad, keep your chin in the air.
A digger of ditches, mechanic, or clerk—
THINK WELL OF YOUR COMPANY,
YOURSELF, AND YOUR WORK!

—Author Unknown.

Montreal Branch. Mr. Willis, the secretary, reports that their regular meeting was held August 1. Only routine business was transacted. There was no educational session. The time was taken up in discussing the letters received from President Fulforth and Vice-President Candee.

Chicago Branch regular meeting was held at the Atlantic Hotel on Saturday, August 10.

Mr. R. C. Fischrupp was elected an associate member. Applications of Messrs. Einor Olsen and Ben. R. Spiegel were given to a committee for investigation.

President Fulforth's letter was read by Mr. J. W. Hanlon and was discussed by the members.

A class in electro-chemistry will be held at Lewis Institute beginning in October.

A prolonged discussion on hydrofluosilic chrome solution control kept the members interested until the meeting adjourned.

E. H. LANZ, *Secy.*

Type "K" Buff for Economy

No waste of compound—it becomes imbedded in the overlap ply on the face, and the buff gives more polishing surface.

Cloth never wastes—it's Bias cut and formed.

This buff costs less in the long run than any ordinary buff you can buy!

Try it.

Type "K" Buff

The BIAS BUFF *and* WHEEL CO., Inc.
430 Communipaw Ave.
Jersey City, N. J.

Type "K" Buff for Better work

Ideal for cutting down. Cuts rapidly, and wears evenly down to the core.

Operators like this buff; it's easy to use, and gives best results in all types of work.

A trial will prove it.

The Lyric Trio

Upper right: (*left to right*) "Bus" Elslager, "River Rat" Hilt, Jack Mylin, Ken McMillen, Hap Hovis, Hen Schneider, W. J. R. Kennedy, Hal Kilheffer, Russ Kuhns.

Lower right: Jake Hoak, "Hog-Caller" Stipe at the Mike, "Spook" Rader, Joe Kirchner, "Schmaltz" Wiegand and the Trio.

LANCASTER BRANCH ANNUAL OUTING

Lancaster Branch held its first annual outing on Saturday, August 10 at the 40 and 8 Club, Eden, Penna.

There was a good attendance. About 25 members of Philadelphia Branch including Supreme President Fred Fulforth and Past Supreme President George Gehling enjoyed the party. The program consisted of baseball, wrestling, quoits, card playing, etc. Refreshments were plentiful. President Critchfield helped to make the outing a more complete success by providing a string trio whose services were much appreciated in the rendering of new and old-time selections.

Frank P. Menninges

We have just been informed by Charles T. McGinley, Secretary of St. Louis Branch, that Mr. Frank P. Menninges met with a fatal automobile accident while he and his wife were returning from their vacation. Mr. Menninges was a hard worker for St. Louis Branch of the A.E.S. and for 9 years was President and Secretary-Treasurer of the local Branch.

Deep sympathy is extended to Mrs. Menninges, with the hope that she will have a speedy recovery from the effects of the accident.

MEETING OF THE RESEARCH COMMITTEE AT UTICA

The sub group of the Research Committee which was given the task of setting up the program of activities met at Divine Brothers plant on Friday, August 16, at 9 P. M.

Those present were as follows: A. B. Wilson, Chairman of the Research Committee; E. A. Anderson; Dr. Blum; E. T. Candee; Carl Heussner; F. Mesle; and J. Dimon representing E. L. Taylerson. Representatives from Divine Brothers and the Exolon Abrasive Company were also present. A meeting of the committee was held in the afternoon at the Hotel Utica which lasted 3 hours.

The Divine Brothers Company offered the committee the use of their automatic machines and operators to run them while the specimens were being polished. The offer was accepted with thanks. All polishing will be done at Utica, the plating operations being carried on at the Bureau of Standards.

Dr. Blum and Mr. Lux our associates at the Bureau will direct the polishing and plating operations.

The attendance at this meeting and the interest shown promises well for a year of real achievements and cooperation. All the meetings of the Research Committee thus far have been well attended which shows the interest being manifested in this important branch of our society's activities.

NEWS ITEM

The Zialite Corporation of Mt. Vernon, New York, has announced that it moved to larger quarters at 143 Exchange Street, Worcester, Mass., early in June. This move has been made so that the company may take better advantage of the services of its technical director, Dr. Ernest D. Wilson, who was recently appointed head of the Department of Chemical Engineering and Chemistry of the Worcester Polytechnic Institute.

The company reports that its sales of Zialite Nickel Plating solution, largely used for the direct nickeling of zinc and aluminum diecastings, have been steadily increasing, with April the largest month in its history.

They also announce a new tin-lead alloy plating solution called Stan-o-lead, which appears likely to have a wide acceptance and field of usefulness. It plates a white, smooth alloy of about 60% tin and 40% lead, offering good corrosion resistance, and which can successfully replace the more expensive cadmium in many instances. It is ideal for articles which must be soldered, such as small parts in the electrical and radio manufacturing fields.

Stan-o-lead operates at room temperature and at current densities up to 50 amperes per square foot. It has 100% current efficiency at both cathode and anode, and maintains the proper rate of tin and lead automatically. It is simple to operate and control.

From a recent* report on a **STEELSHINE** buffing test.

". . three men picked the five samples in the order of their brilliance and in each case each man chose the same sample as best, . . STEELSHINE took the first honor."

Why not try STEELSHINE ROUGE and see for yourself? Made in a number of grades for all stainless steels and for chromium.
Particularly recommend #7 – fast cut, little color: #14 good cut and color: #190 & #126 high lustre.
* Name upon request.

E. REED BURNS MANUFACTURING CORPORATION 41 WITHERS STREET BROOKLYN, N. Y.

HISTORIC BOSTON

extends an invitation to the

AMERICAN ELECTROPLATERS' SOCIETY

29th ANNUAL CONVENTION

JUNE 9-10-11-12, 1941

HOTEL STATLER - BOSTON, MASS

Boston Branch is ready, as the Minuteman of 1775, to make your 1941 convention the most successful national meeting in A. E.S. history

Convention Chairman

Joe Barron
143 Sidney St.
Cambridge, Mass.

Financial Secretary

Andrew Garrett
100 King St.
Dorchester, Mass.

The National Convention under one Roof

Two Important Announcements

I. *STAN-O-LEAD*—a new bath plating a tin-lead alloy. Corrosion resistant, and cheaper than cadmium.

Ideal for parts which must be soldered as it fuses easily.

Room temperature operation, 100% current efficiency, current densities up to 50 amperes per square foot, giving rapid deposition.

Simple to control and easy to operate.

Send us some small parts ready for plating to see how this bath meets your needs.

II. *THE ZIALITE CORPORATION* announces the removal, early in June, of its office, laboratory, and factory from Mt. Vernon, New York, to larger quarters at

143 Exchange Street

WORCESTER, MASSACHUSETTS

Please note the change of address

Manufacturers of

"Zialite"

REG. U.S. PAT. OFF.

Nickel Plating Solutions for Die Castings

HEADQUARTERS FOR GOLD & SILVER SALTS

Merck Gold and Silver Salts are manufactured carefully and by precision methods. The finished products must undergo a score of separately conducted tests. Even minor metallic impurities are removed entirely or reduced to insignificant limits.

Prices Will Be Mailed on Request

The Merck line includes:

GOLD

Bromide **Tribromide**
CYANIDE **CHLORIDE**
& Potassium Cyanide
& Sodium Chloride
& Sodium Cyanide

SILVER

Precipitated **Acetate**
Bromide **Carbonate**
CHLORIDE **CYANIDE**
Iodide **Sulfate**
OXIDE **NITRATE**

MERCK & CO. INC. *Manufacturing Chemists* **RAHWAY, N. J.**

New York Philadelphia St. Louis

DETROIT BRANCH ANNUAL OUTING

The annual picnic of the Detroit Branch was held at Sandy Mac's on August 3rd. It was the usual enjoyable occasion.

The committee, headed by George Nankervis, had done a good job in planning, just as they always do, and everything clicked nicely. The weather, fortunately, was not unbearably hot, and there was no rain.

The morning was taken up with golf, croquet, horse-shoe pitching, cards, greeting friends, swapping lies, etc. The attendance was 225. Among other distinguished visitors were Messrs. Fulforth, Kennedy, and Goodsell, with representatives from Chicago, Toledo, Grand Rapids, etc. Ray Goodsell was the first arrival in the morning, and when he drove in with a Wisconsin license, one of the attendants wanted to know whether he had driven clear from Wisconsin for the picnic. On being answered in the affirmative, said attendant remarked to no one in particular that there were people in the world crazier than he. However Ray seemed to think it was worth while.

At noon a luncheon was served of a large variety of sandwiches plus corn on the cob, cooked in the open. Of course beer and soft drinks flowed freely all day. Our reputation for truth and veracity has always been good, and we will not endanger it by giving you the figures on the number of ears of corn consumed, but frankly, when we heard it we felt sure that some horses must have mingled with the crowd.

It turned out that we were right, because after lunch the games started, and one of the early ones was horse and rider polo. Apparently the horses had fortified themselves well during the luncheon time, and they needed it. One man carried another on his back, while the rider attempted to bat along a wooden ball on the ground. In spite of their lack of training, some of the horses exhibited almost as much intelligence as a good polo pony. However we can hardly truthfully say that the shots of the players were as good as some we have seen. (We never saw but one polo match and that was not very good, but the comparison still stands.) However we would like to bet that no self-respecting polo pony could have been persuaded to perform on a hot day with almost his own weight on his back, which proves something or other, we are not sure what.

The egg-throwing contest is always a source of great amusement, as well as the kiddie kar race. Just what it is that makes a man's legs suddenly grow three feet longer as soon as he gets on a kiddie kar might make a good subject for research for somebody looking for a master's degree.

The bachelors in the crowd must have derived great comfort from the mother-in-law special. In this, a can was set up on a barrel and all our brave boys threw rolling pins at it. That is about all they did do, throw at it. Sometimes it would have been hard to guess what they were throwing at. If the gals cannot throw any better than those boys did, the rolling pin can hardly be classed as a lethal weapon. (If you think it is easy, try it some time.)

There was also a new brand of leap-frog and the usual tug of war.

Then came a seven inning soft-ball game and strange to say, it was really a good game. Instead of the usual 35 to 24 game, it was close all the way with one team leading 3 to 2 until the last inning, and then the other coming through to take the game 4 to 3. Some of the fielding was good enough to bring out charges of professionalism by the opposing team. The umpiring was of a very high order, particularly that on the bases. We ought to know. We did it, and honestly we were not in danger of being mobbed more than twice.

Too bad you were not there. Remember it next year.

The list of prize winners follows: Golf, Sheridan, Kranik, Cassey; Golf Pitching, Reicher; Horse-Shoes, Gillette, Mcgill; Horse and Rider Polo, Gillette, Simons; Leap-Frog, Charlton, Amburen; Mother-in-Law, E. Beightol; Kiddie Kar, Paul, Sheridan, Grauzer, Bosley; Egg Throwing, Grauzer, Matese; Tug-of-War, Goodsell, Fulforth; Baseball, Both winning and losing teams.

Divine
COMPRESS
POLISHING WHEELS

Finer finishes—at lower cost

Divine Brothers Company

62 Whitesboro St., UTICA, N. Y.

Quality Products Since 1892

EXPERIENCED ELECTROPLATERS
prefer
ANACONDA
Copper Anodes

... because their unexcelled purity assures uniform corrosion, the highest quality deposit in the shortest possible time and low scrap losses. Furnished with suspension holes drilled as desired, or tapped for end hooks.

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THE AMERICAN BRASS CO.
General Offices, Waterbury, Conn.
Offices and Agencies in Principal Cities

pH PAPERS
FOR DETERMINING pH VALUES OF SOLUTIONS

ACCURATE RESULTS IN FEW SECONDS

Just dip strip of pH paper in solution and read off pH value. Can be carried in pocket. Always handy.

AVAILABLE RANGES

Acid:	*Alkaline:*
pH 5.2—6.7 (nickel)	pH 6.6— 8.1
3.6—5.0 (nickel)	8.2— 9.7
3.7—5.3 (zinc)	9.2—11.0
1.9—3.4 (copper, nickel)	(brass, copper, silver)
0.9—1.5 (copper, etc.)	11.0—13.5 (Cadmium, zinc, tin and cleaners)

Each Range is Separately Boxed.

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456 Fourth Avenue New York City
Canada: Jaquays; Starke & Co., Montreal

Used Buffs for Sale

64-68—1⅛" arbor—20 ply

Full Disc - Loose - or Sewed

Thousands of every size

8"—8¢ each 9"—9¢ each

10"—12¢ each

MICHIGAN BUFF CO., INC.
4054 Beaufait Ave. Detroit, Mich.

Providence-Attleboro Branch conducted one of their summer meetings at the camp of Jim Potter on Lake Watchaug in Charleston, R. I., on Saturday, July 13th.

The affair was conducted in the form of an outing with the usual refreshments, etc. Bill Cahill made one of his clam chowders, that have become so famous of late years, and (Arthur Mintie, take notice) everyone in attendance voted it, after the pH had been adjusted, the best they had ever eaten. It is hard to believe, but Bill was noticed partaking of the second and third helping himself. We have often wondered whether Mintie has even eaten any of *his* own making.

Most of the day was taken up with the business of pitching quoits and can the boys of this branch pitch them. Ringer after ringer was thrown by such pitchers as MacLean of Reed & Bartons and Chace of Gorhams; of course, these men are old hands at it and expect no great amount of credit for giving the others such a drubbing. Whitman and Don Wood did fairly well but we think Tom Barron, Dr. Bandis, Charles Law and Arthur Wood were close runners up. Frank Smith of the Weisberg Laboratory did very well but you can't throw quoits with one hand and listen to Joe Smith with the other and get anywhere, even though the stakes were but four or five feet apart in this instance.

Jim (Jessie Lasky) Potter ground his motion picture camera most of the day and we suspect he got some swell shots (or did he?) for use as a means of entertainment at our September meeting.

Joe Smith entertained, inside the camp house, with some almost unbelievable card tricks, then finished off his act with approximately 150 stories of the type you could expect Joe to tell.

Don Wood heat-treated a few of the hamburgs to a point beyond fitness for human consumption, whereupon the boys pounced upon him, retrieved the broiling apparatus and proceeded to cook their own from there on in.

Lining the walls of the camp house, Jim Potter has arranged many old Indian relics and we were not there long before the two Woods, Donald and Arthur, (the latter insists he is no relation) began wielding the tomahawks in a not unnatural manner. Now we don't wish to imply anything, but we thought these boys sort of "took to these things" in a way, that—oh, well, it is only what we had always believed so why talk of it further.

Bob MacLachlan proved himself to be a real sport. He pitched quoits nearly all p. m. never coming anywhere near the stake, yet on and on he pitched and pitched with never a complaint. Good old Bob.

Well, thanks to Brother Potter for the use of a fine camp and we predict the event will be repeated next Summer as usual.

Final returns from the other sports events show MacLean and Chace far in the lead in all divisions.

Some of the boys journeyed to nearby Charleston Beach for a swim (the camp lake being too tame, as they put it) but they soon found Rhode Island waters much too rugged and they returned looking as dry as was the outing after certain of the refreshments ran out, as they usually do.

CHACE and MACLEAN, *Scribes*

S. H. Renton

Mr. S. H. Renton died at the home of his sister, Mrs. Gessman, at Hueston, Pa. Mr. Renton died of a heart attack. He was buried July 23, 1940, at the Michigan Masonic Cemetery in Detroit, Michigan.

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"B-4 CHROME" CLEANER

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"Let's boost Boston's A. E. S. Convention next June 9-10-11-12"

ROBERT S. LEATHER

Robert S. Leather is President of Lea Manufacturing Company of Waterbury, Conn., manufacturers of Lea Compound for producing satin finishes on metals, wood and plastics.

The Lea Company also furnishes "Synstrip" a fast working stripper for removing baked enamels, nickel Glo, a nickel Brightener, burnishing cream, Lea Burnishing Powder and many other plating and polishing room supplies and equipment.

Mr. Leather's "pal" in the picture Shamus O'Lea (so named by Earl Couch) is 3 years old and was given to Bob at the age of 8 months by Ray O'Connor of Bridgeport. This Irish Wolf hound, a rare breed in this country eats from three to five pounds of meat at a meal. He takes a daily marathon of six to ten miles for exercise and is seven feet tall when standing upright.

PERMAG Cleaning Compounds

Perfect Cleaning for Perfect Plating

PERMAG produces the chemically clean surface which insures against rejects. PERMAG cleans quick — and at low cost. Write for details.

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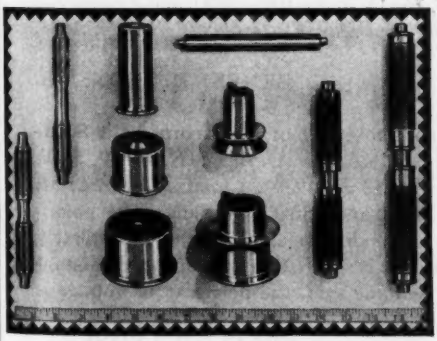
WANTED—OLD COPIES OF THE REVIEW

If any of our readers have a copy of the Review for January, 1932, Dr. Blum, National Bureau of Standards, Washington, D. C., would appreciate receiving it so that a completely bound file may be had at the Bureau Library.

Packer-Matic Automatic

POLISHING & BUFFING MACHINES



← *For Textile Parts*

The usually tough jobs of Finishing are easily and economically done on Packer-Matic. Parts, large and small, varied shapes and different metals are efficiently, and more uniformly, polished and buffed on Packer-Matic, which is made in ROTARY — STRAIGHT LINE CONVEYOR and ROLL types.

Send your PART for a "Time Study," gladly given gratis. WRITE Engineering Dept.

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The Abstract Section

CHARLES C. CONLEY, *Chairman, Program and Educational Committee*

Electrolytic Stripping of Copper from Zinc Base Die Castings. By W. B. STODDARD, JR. *Trans. Electrochemical Society* **77** (Preprint 22) (1940). Copper is removed from zinc or zinc alloys without affecting the basis metal, using 65-130 amps./sq.ft. of 50-60 cycle alternating current in a bath of CrO_3, 200-500 g./l. (27-67 oz./gal.), H_2SO_4 2-5 g./l. (0.27-0.67 oz./gal.). Temperature (20-25° C., 68-77° F.) and the 100-1 CrO_3/SO_4 ratio are critical factors. Coatings 0.0003-0.0004 inches thick require 15-20 minutes treatment. The objects to be stripped constitute both electrodes. Before replating, the passivity of the zinc must be removed by buffing or dipping in dilute HCl.

ERNEST H. LYONS, JR.

The Electrolytic Etching of Brass. By G. C. WILLIAMS and G. REIGER. *Trans. Electrochemical Society* **77** (Preprint 20) (1940). The preparation of brass specimens for metallographic examination by etching with 31 amps./sq.dm. (288 amps./sq.ft.) anodic current in an ammonia-acetate-thiosulfate solution is discussed.

ERNEST H. LYONS, JR.

The Theory of the Potential and the Technical Practice of Electrodeposition. I. The General Problem and the Cases of Uniform Flow. By CHARLES KASPER. *Trans. Electrochemical Society* **77** (Preprint 23) (1940). A detailed exposition and discussion, from the standpoint of the theory of the potential, of the distribution of electric current through an electrolyte for certain types of electrodes. This material was presented more briefly by Kasper in *The Monthly Review A.E.S.* **26,** 11-26, 91-109 (1939), and *Proceedings of the 26th Annual Convention of the American Electorplaters' Society,* **1938,** 21-32.

ERNEST H. LYONS, JR.

Polarization During the Electrodeposition of Tin from Acid Solutions of its Simple Salts. By M. LOSHKAREV, O. A. ESIN, and V. SOTNIKOVA. *J. Gen. Chem. (U.S.S.R.)* **9,** 1412-22 (1939); *Chemical Abstracts* **34,** 1255 (1940). A theoretical study in $SnCl_2$ and $SnSO_4$ solutions. The polarization voltage at the anode and at the cathode is small, and can be completely eliminated by agitating the electrolyte. It is due to the slow diffusion of stannous ions. In the presence of cresol sulfonic acid, the polarization voltage is high.

ERNEST H. LYONS, JR.

Pickle Polished Stainless Steel. *The Iron Age,* January 11, 1940, Page **22.** Electrolytic polishing of tin, copper, aluminum, nickel, cobalt and certain

STAINLESS STEEL POLISHING COMPOUNDS

Are Proven Every Day in Every Kind of a Metal Working Plant

"4-A" Polishing Compounds Are Faster, More Efficient, More Economical for Polishing, Mirror Finishing of All Kinds of Steel, Including Stainless Steel and Other Alloys.

Use it on any kind of a wheel, soft, hard, medium. Results will speak more eloquently than anything we could say.

Tell us about your toughest job, and we'll be glad to send the "4-A" product that will solve your problem. No obligation, of course.

CEMENT AND THINNER

Instead of glue, use "4-A" Cement and Thinner, a uniform substitute for Polishing Wheels, Belts, Buffs, Rolls, etc.

Samples of Compound or Cement sent on request.

HARRISON & COMPANY

HAVERHILL, MASS.

alloys is now a common industrial process, but the electrolytic polishing (anodic treatment, pickle polishing, bright pickling) of stainless steel is comparatively new. The following processes, covered by patents are now in commercial use: The Allegheny-Ludlum method employes the use of straight phosphoric acid with possible variations of the electrolyte. The Rustless Iron & Steel Corporation employs a mixture of concentrated citric and dilute sulphuric acids. American Rolling Mills (associated with Rustless in this work) has other similar types on file, the characteristics of which are not known. The process of Sam Tour involves the use of sulphuric and hydrofluoric acids. All methods claim highly lustrous surfaces. Most processes operate at 2-6 amps. per sq. in. Article also describes several commercial installations, explains practical commercial value of process and cites difficulties to be overcome.

D. S. HARTSHORN, JR.

Paint Baking with Near Infra-Red. *Chemical & Metallurgical Engineering*, February, 1940. H. J. BENNETT and HOWARD HAYNES. The application of radiant heat from incandescent lamps to drying and baking paint films offers the following advantages over the conventional methods: "Greater speed, lower equipment and installation costs, cleaner and more comfortable working conditions, greater adaptability to changing schedule and elimination of warm-up periods." The paints best suited for use with drying lamps are the synthetic enamels, lacquers, and synthetic lacquers. Because oil paints and oleo-resinous materials require considerable oxidation during the drying process they cannot be as rapidly baked. In some cases where the white or light color of the finish reflects the heat, more rapid drying may be effected by exposing the unpainted side to the rays of the lamps. Gold plated reflectors are best suited for reflecting the infra-red energy. The usual distances from lamp to work are 6 to 18 inches.

D. S. HARTSHORN, JR.

Tinning Copper and Brass by Immersion. By JOHN D. SULLIVAN and A. E. PAVLISH, *Metals & Alloys*, May 1940, p. 131. Tin may be readily deposited on copper or brass by immersing in one of the following solutions:

(1) Potassium Acid Tartrate Saturated Solution
Stannous Chloride 4 to 30 grams
Water 1 liter
Temperature 200° to 212° F.

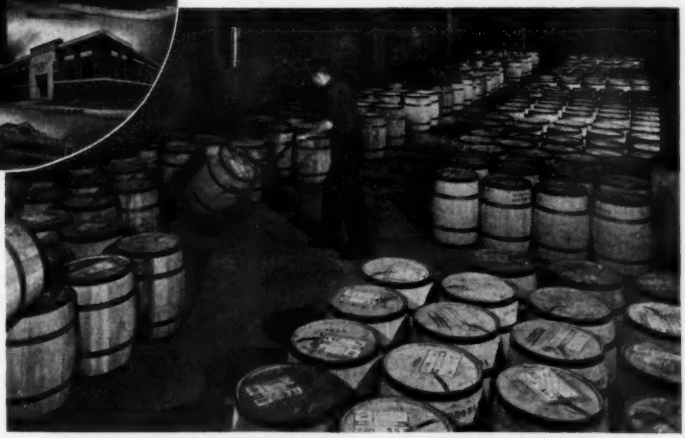
(2) Ammonium Alum 20 to 30 grams
Stannous Chloride 1 to 2 grams
Water 1 Liter
Temperature 200° to 212° F.

(3) Stannous Chloride 15 grams
Sodium Hydroxide 18.7 grams
Sodium Cyanide 7.5 grams
Water 1 Liter
Temperature 200° to 212° F.

NORTON SERVICE

...Distribution

FACTORY, BRANCH WAREHOUSE AND DISTRIBUTOR STOCKS



RIGHT: SCENE IN THE CHICAGO WAREHOUSE — A TYPICAL NORTON SERVICE BRANCH

1. Large, well-filled stock rooms at Worcester; 2. Branch warehouse stocks in five industrial centers; 3. Distributor stocks in 150 key cities of the United States — it is these three elements that form the Norton distribution system and, meshing smoothly together, they assure prompt abrasive service the country over. And supplementing these stock facilities there are the manufacturing facilities of the Norton electric furnace plant and the processing facilities of the Worcester plant — the most modern equipment for producing the highest quality abrasive grain in the shortest possible time.

NORTON COMPANY, WORCESTER, MASS.

G-101

NORTON ABRASIVES

Ordinarily the articles are treated in contact with metallic zinc which serves as an internal source of current. The deposit is formed by the replacement of tin in the bath and the copper dissolved from the piece. The action ceases when no more copper is exposed. Within certain limits the thickness of the deposit is proportional to the period of immersion. A 5 minute period will make a deposit of .000005 inch, 24 hours a deposit of .00014 inch. If a tin coated article is heated slightly above the melting point of tin, a tin-copper alloy is formed. The exposed surface may then be given an additional immersion tin treatment. Exposure tests in the presence of saturated hydrogen sulphide indicate that a high sodium cyanide content, 25 to 50 g/l (formula 3) produces a more continuous and less porous deposit. This process has an application as an aid to soldering, a temporary protection against corrosion and to the plumbing industry where its use will decrease the attack on the inside of brass plumbing fixtures.

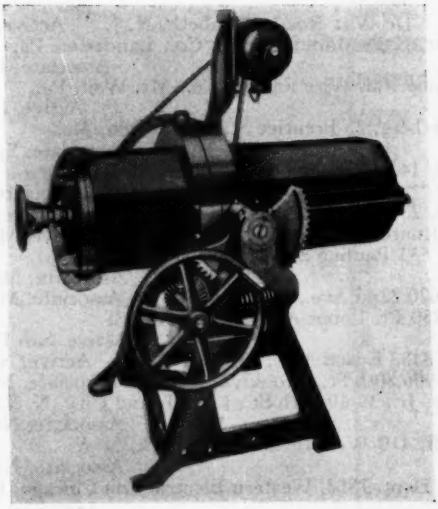
The Selenium Rectifier for Electroplating. By JOSEPH B. KUSHNER, *Metal Finishing*, August 1940, p. 424. The selenium rectifier operates on the principle of the crystal detector allowing current to flow in one direction and offering high resistance to a flow in the opposite direction. It is constructed of a series of steel rectifier discs covered on one side with a .05 millimeter layer of metallic selinium and a layer of a soft metal alloy respectively. The unit contains no moving parts except in the large installations where cooling fans are required. The efficiency of the selenium rectifiers excedes that of the conventional motor generator sets. Illustrations and efficiency curves are also given.

Polishing and Its Phases. By JOSEPH G. STERLING. *Metal Finishing*, August 1940, p. 427. The importance of correct selection of polishing grit and glue, method of applying the prepared wheel is explained. The value of cooperation between the design engineer and the finishing foreman in selecting steels of high finish is stressed.

The Influence of Organic Compounds in Nickel Plating Solutions Parts I, II and III. By ERNEST RAUB and MAX WITTUM, Translated from the German by D. WALTER R. MEYER, Editor, *Metal Finishing*, April 1940, p. 206, June 1940, p. 315, July 1940, p. 429. Results of the effects of over a hundred organic addition agents on nickel deposits are given. The solution used was composed of 22.8 oz./gal. single nickel salts, 4 oz./gal. nickel chloride and 3.35 oz./gal. boric acid, temperature 71.6° to 73.4° F., and current density 2.8 to 14 amps./ft^2. Compounds investigated included aliphatic compounds, aldehydes, ketones, carbohydrates, esters, nitrogen compounds, sulphur compounds, proteins, proteinlike compounds, aromatic compounds, acids and aromatic nitrogen compounds, hetrerocyclic and aromatic and heterocyclic sulfonic acids. Results of the investigation are classified and show a marked similarity between effects of compounds in the same groups. Photomicrographs of deposits are given.

D. S. HARTSHORN, JR.

Lasalco Burnishing Barrels



LASALCO, INC.

2822-38 LASALLE ST.

ST. LOUIS, MISSOURI

Membership Report

ELSWORTH T. CANDEE, *Chairman, Membership Committee*

To August 1, 1940

ELECTIONS

Paul Lyman, Westinghouse Electric and Mfg. Co., Springfield, Mass.
Associate, Springfield Branch

H. L. Bache, 21 Inchcape Ave., Handsworth Wood, Birmingham, England
Associate, Springfield Branch

Herbert R. Sill, P. O. Box # 12, East Orange, N. J.
Associate, Newark Branch

Zachary Irenas, 1 De Witt Road, Elizabeth, N. J. Active, Newark Branch

Martin Dellinger, K-D Manufacturing Co., Lancaster, Pa.
Associate, Lancaster Branch

R. Hoenstine, American Wire Fabrics Co., Mt. Wolf, Pa.
Active, Lancaster Branch

Albert W. Westerberg, 23 Prentice St., Springfield, Mass.
Associate, Springfield Branch

H. Tom Collord, 1430 Rosedale Court, Detroit, Mich.
Associate, Toledo Branch

Frank R. Jacobs, 234 Piper St., Sidney, Ohio Active, Dayton Branch

Thomas Laken, Route 1, Box 392, Kenosha, Wis. Active, Milwaukee Branch

Paul R. Nesson, 531 Pauling St., Madison, Wis.
Associate, Milwaukee Branch

Allen L. Cook, 6620 22nd Ave., Kenosha, Wis. Associate, Milwaukee Branch

William Stone, 250 Pt. Lobos Ave., San Francisco
Active, San Francisco Branch

Mariano Ranno, 3433 Edson Ave., Bronx, N. Y. Active, New York Branch

Sigmund Katz, 1906 80th St., Brooklyn, N. Y. Associate, New York Branch

Martin F. Maher, Jr., 39-49 45th St., Long Island City, N. Y.
Associate, New York Branch

Lionel de Waltoff, 410 W. 58th St., New York, N. Y.
Associate, New York Branch

C. R. Fischrupp, Dept. 7853, Western Electric Co., Chicago, Ill.
Associate, Chicago Branch

George P. Needham, *c/o* Cowles Detergent Co., 10525 Carnegie Ave., Cleveland, Ohio Associate, Cleveland Branch

William J. Miller, Jr., Box 533, Roslyn, Pa. Active. Philadelphia Branch

Leroy Camel, Detroit Rex Products Co., Cleveland, Ohio
Associate, Cleveland Branch

APPLICATIONS

J. Walter Miller, 411 E. Chestnut St., Lancaster, Pa.
Active, Lancaster Branch

H. S. Fisher, 735 E. Chestnut St., Lancaster, Pa.
Active, Lancaster Branch

William Wood, 116 Hollwyood Ave., Reading, Pa.
Associate, Lancaster Branch

W. W. Young, Steel City Electric Co., Pittsburgh, Pa.
Active, Pittsburgh Branch

Gordon L. Craper, 131 Bloomfield St., Springfield, Mass.
Associate, Springfield Branch

Ray Emerson Pepper, Box 55, Pemberton, Ohio Associate, Dayton Branch

Kenneth L. Martin, R. R. # 5, Sidney, Ohio Associate, Dayton Branch

Membership Campaign

BRANCH	May 1, 1940	Change in Membership	Percent Change
Lancaster	25	+9½	+38
Cincinnati	36	+6	+16.6
Toledo	40	+4½	+11.2
Rochester	62	+6½	+10.5
Grand Rapids	52	+5	+9.6
Boston	79	+7½	+9.5
Montreal	23	+2	+8.7
Prov.-Attleboro	38	+3	+7.9
Springfield	49	+3½	+7.2
Los Angeles	58	+4	+6.9
San Francisco	19	+1	+5.3
Cleveland	75	+4	+5.3
Chicago	225	+8	+3.5
Anderson	38	+1	+2.6
Waterbury	66	+1½	+2.4
Dayton	62	+1	+1.6
New York	100	+1	+1
Bing.-Syracuse	22	0	0
New Haven	115	0	0
St. Louis	77	0	0
Hartford	45	—½	—1.1
Milwaukee	84	—1	—1.2
Detroit	250	—4	—1.6
Toronto	67	—1	—1.6
Newark	125	—2	—1.6
Baltimore-Wash.	49	—1	—2.2
Philadelphia	137	—3½	—2.5
Buffalo	57	—1½	—2.6
Pittsburgh	33	—3	—3.3
Bridgeport	71	—4½	—6.3

NOTE: Honorary members are included with each Branch.

Einar Olsen, *c/o* Advance Plating Co., 771 West Lexington St., Chicago, Ill. Active, Chicago Branch
Ben R. Spiegel, *c/o* Swartz & Co., 10 S. Wabash Ave., Chicago, Ill. Active, Chicago Branch
John A. Vignos, 516 McGregor Ave., N. W., Canton, Ohio Associate, Cleveland Branch

SUSPENSIONS

Edward R. Dupuis, Springfield Branch
Dr. Raymond de Buyer, Balto.-Washington Branch
Charles L. Cope, Milwaukee Branch
Louis N. Bush, Milwaukee Branch
Henry A. Painter, New York Branch
Fred A. Kelm, New York Branch
H. Fedde, San Francisco Branch
O. Henninger, Chicago Branch
H. DeGrenier, Chicago Branch

RESIGNATIONS

N. H. McKay, 1100 Pitt St., Wilkinsburg, Pa. Active, Pittsburgh Branch
Frank Green, 2018 City Coucillors St., Montreal, Que. Active, Montreal Branch
W. T. Donnelly, 4237 Kenmore Ave., Chicago, Ill. Associate, Chicago Branch
L. H. Seabright, 119 N. Parkside Ave., Chicago, Ill. Associate, Chicago Branch
F. J. Kaim, *c/o* Union Brass & Metal Mfg. Co., St. Paul, Minn. Associate, Chicago Branch

DEATHS

S. H. Renton, 11635 Robson St., Detroit, Mich. Associate, Pittsburgh Branch
Frank P. Menninges, 4019 Tnolzan St., St. Louis, Mo. Active, St. Louis Branch

TRANSFERS

Fanner J. George from Buffalo to Boston Branch
James Guffie, 5268 Kensington St., Detroit, Mich. from Waterbury to Detroit Branch
John A. Turk, 230 N. Canal St., Chicago, Ill. from Cleveland to Chicago Branch

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REGARDING MEMBERSHIP TRANSFERS

There has been so much unnecessary delay in the transfer of members from one branch to another, that it is deemed advisable to confine the necessary details to the branch secretaries, rather than have the individual involved carry out the transaction.

In the future it should only be necessary for the member desiring a transfer to request the secretary of the branch of which he is now a member to mail the prescribed form to the secretary of the branch receiving the transfer. The Executive Secretary should be notified by the latter branch that the transfer has been made so that we can change our books accordingly. The new address should also be included.

All transfers, suspensions, resignations, deaths, applications, and elections should be carefully noted in the quarterly membership report.